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SOIL AND EARTH TEMPERATURES AT SOME AGRO-METEOROLOGICAL STATIONS IN ENGLAND AND WALES

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INTRODUCTION

The tables in this publication contain brief comprehensive summaries of soil temperatures at depths of 4 in. and 8 in. below bare soil, and earth temperatures at a depth of 2 ft. below grass or bare soil.

Choice of stations:- Soil temperature at depths as shallow as 4 in. and 8 in. have a significant diurnal variation with maximum temperatures usually occurring in the afternoon before 15h. at the 4 in. depth and after 15h. at the 8 in. depth. The choice of stations has therefore been limited to those which reported temperatures more than once a day at these depths during a period of at least five years; in almost all instances this period was less than ten years, whereas the overall period for which single daily (9h.) observations are available from the station may be as much as 30 years.

Times of observation:- During the first part of the period, observations at 4 in. and 8 in. were usually recorded at 9h., 15h. and 21h. G.M.T.; but, after 1934, records are available only from Woburn and Newton Rigg for times of observation other than 9h. No autographic records of soil or earth temperatures were available from any of the stations.

Methods of observation - The 4 in. and 8 in. soil temperatures were measured by bent-stem mercury-in- glass thermometers under bare soil. It has been assumed that these thermometers maintain adequate contact with the soil under all weather conditions. The 2 ft. earth temperatures were measured by Symons earth thermometers with bulb suspended at a depth of 2 ft. below a grass surface (unless stated otherwise) inside a steel tube. No corrections have been applied for any possible conduction or convection of heat within the tube. Such corrections would only be of the order of $\frac{1}{2}$°F. at the worst.

Reduction to daily means - With only three observations a day it is not possible to form a very accurate picture of the diurnal temperature changes. However Wright* has shown that the second harmonic of diurnal variation of soil temperature at 4 in. or 8 in. is small ; it is therefore assumed that a reasonable approximation to the diurnal variation will be given by the first harmonic alone. If θ_9, θ_{15}, θ_{21} are the soil temperatures at 9h., 15h. and 21h. G.M.T. the mean daily temperature is given approximately by:-

$$\bar{\theta} = \frac{1}{2}(\theta_9 + \theta_{21}) \qquad \ldots\ldots \quad (1)$$

* WRIGHT, M. L.; The variation of soil temperature below turf: a discussion of observations at Kew Observatory. Mem. R. met. Soc., London, 4, No.31, 1931.

the daily range of temperature is given by:-

$$R = \sqrt{\{2(\theta_{15} - \theta_9)^2 + 2(\theta_{15} - \theta_{21})^2\}} \quad \ldots\ldots\ldots (2)$$

and the time of maximum or minimum temperature is given by:-

$$\varepsilon = \frac{12}{\pi} \tan^{-1}\{(\theta_{15} - \theta_9)/(\theta_{15} - \theta_{21})\} \quad \ldots\ldots\ldots (3)$$

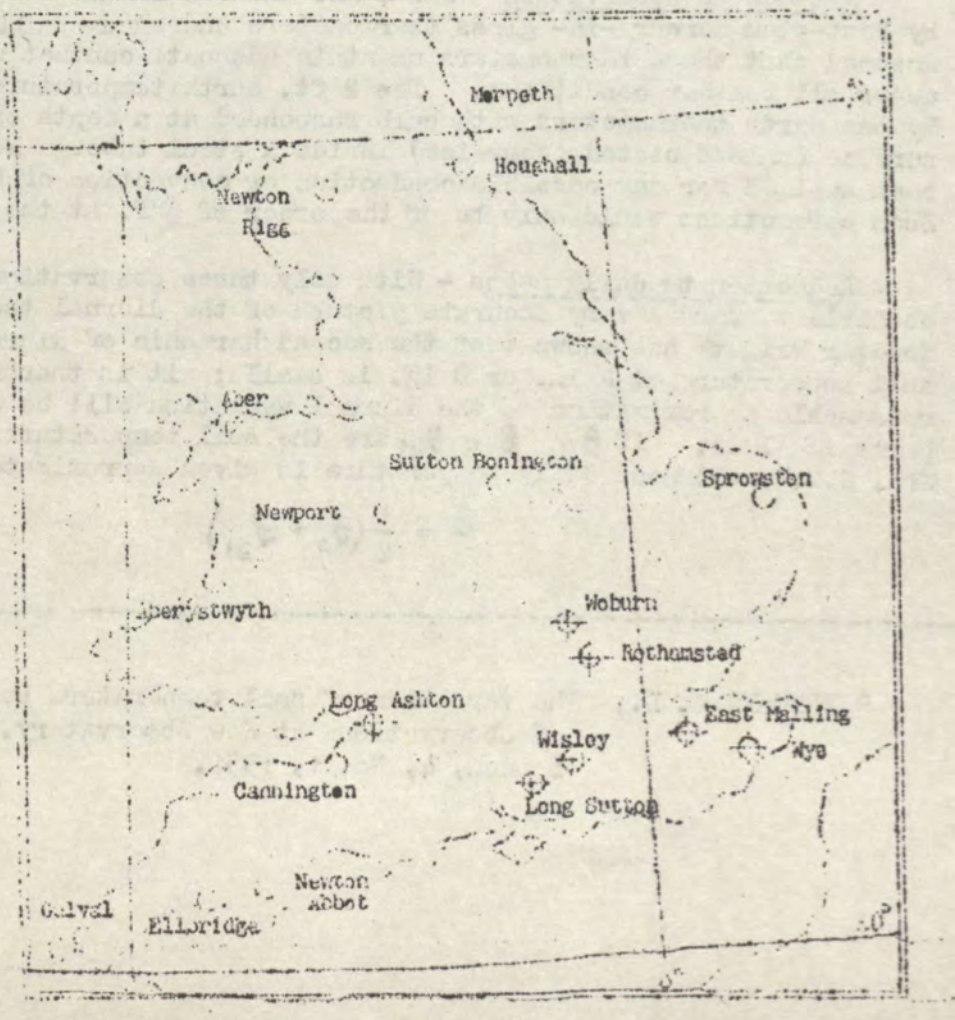
the maximum being in the afternoon and the minimum in the morning.

The tables give for each station, for each depth, first the monthly and yearly average soil temperatures at each hour, for the comparatively short period during which the three daily observations are available, so that average values of θ, R and ε may be calculated for this short period. In each table, the last two rows for each level of observation give the average over a longer period of the 9h. G.M.T. soil temperature and an estimate of the monthly averages over this same longer period of the true daily mean soil temperature. This estimate is made by assuming that the same average diurnal variation found for the shorter period will also apply to the longer period. Thus, if primed variables apply to shorter period observations and unprimed variables to the longer periods, the assumption is equivalent to the relation:

$$\bar{\theta} = \bar{\theta}_9 + \tfrac{1}{2}(\bar{\theta}'_{21} - \bar{\theta}'_9)$$

The diurnal variation of temperature at the 2 ft. depth is negligible, the amplitude being of the order of 0.1°F., and it is therefore safe to assume that average 2 ft. earth temperatures measured at 9h. G.M.T. are approximately the same as average daily mean 2 ft. earth temperatures.

Soil and Earth Temperature Stations



○ 4 in. and 8 in.

⊕ 4 in., 8 in. and 2 ft.

Average soil and earth temperature at: ABER

53°14'N. 4°01'W. ht: 60 ft. Period 1926-55

Time of observation	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
	degrees Fahrenheit												
4 in. depth 1926 - Aug. 1932													
9h.	40.3	38.8	40.7	45.0	51.1	57.5	60.1	58.7	55.3	49.3	44.6	41.0	48.5
15h.	41.4	41.2	44.9	50.5	57.2	64.2	65.9	64.4	59.9	52.3	46.3	42.0	52.6
21h.	40.6	39.8	42.6	47.3	54.5	61.5	63.4	61.3	57.5	50.3	45.0	41.2	50.4
1926-55													
9h.	40.3	39.7	41.5	46.1	51.4	57.1	60.1	58.3	55.8	50.4	45.6	42.2	49.1
Estimated mean of daily means	40.5	40.2	42.5	47.3	53.1	59.1	61.7	60.6	56.9	50.9	45.8	42.3	50.1
8 in. depth													
1926 - Aug. 1932													
9h.	41.2	39.9	41.0	45.1	51.0	56.6	59.5	58.9	56.2	50.4	45.9	42.3	49.0
15h.	41.5	40.5	42.3	46.6	52.8	58.7	61.4	60.6	57.3	51.4	46.3	42.4	50.1
21h.	41.2	40.3	42.1	46.6	53.6	59.3	61.6	60.6	57.3	50.9	45.9	42.2	50.1
1926-55													
9h.	41.2	40.5	42.0	46.1	51.0	56.5	59.4	59.2	56.3	51.3	46.6	43.2	49.4
Estimated mean of daily means	41.2	40.7	42.5	46.9	52.3	57.9	60.5	60.1	56.9	51.5	46.6	43.1	50.0
1926-55 2 ft. depth													
9h.	43.6	42.6	43.4	46.7	50.5	55.1	58.2	58.7	57.3	53.6	49.3	45.9	50.4

Soil type: More than 2 ft. of stony clay above gravel

Remarks: Change of site: May 18, 1950.

Observations missing at 4 in. depth April-June 1927 and March-April 1931.
Observations missing at 8 in. depth March-July 1926 and April-May 1927.
8 in thermometer broken, February 4-14, 1934 and April 8-22, 1938.

G.1125/59/9/59/50.

Average soil and earth temperature at: ABERYSTWYTH P.B.S.

52°25'N. 4°3'W. ht: 450 ft. Period 1926-55

Time of observation	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
	degrees Fahrenheit												
4 in depth Jan. 1926-Dec. 1932													
9h.	39.9	38.8	40.7	45.0	51.1	56.7	59.4	58.9	55.8	49.4	44.-	41.0	48.4
15h.	40.2	40.3	43.5	49.1	56.2	62.4	64.0	63.3	59.3	51.6	46.3	44.6	51.6
21h.	40.5	39.7	42.6	47.5	54.2	60.0	62.0	61.3	57.5	50.5	45.2	41.3	50.2
1926-55													
9h.	39.7	39.2	41.3	46.0	51.7	57.1	59.6	59.7	56.2	50.4	45.2	41.9	49.0
Estimated mean of daily means	40.0	39.7	42.3	47.3	53.3	58.7	60.9	60.9	57.1	50.9	45.5	42.1	49.9
8 in. depth													
Jan. 1926-Dec. 1932													
9h.	40.7	39.9	41.6	45.0	50.7	56.1	58.9	58.9	56.0	50.7	45.7	42.2	49.9
15h.	40.8	39.9	41.9	45.9	51.7	57.2	59.7	59.7	56.9	50.9	45.9	42.1	49.4
21h.	40.9	40.2	42.4	46.5	52.5	58.0	60.4	60.3	57.4	51.2	46.0	42.2	49.8
1926-55													
9h.	40.9	40.2	42.0	46.1	50.9	56.4	59.0	59.5	56.6	51.5	46.4	43.1	49.4
Estimated mean of daily means	41.0	40.3	42.4	46.9	51.8	57.3	59.7	60.2	57.3	51.7	46.5	43.1	49.9
2 ft. depth 9h.													

Soil type: Light loam, shallow

Remarks: 4 in. observations missing: Mar. 1929, Nov. 1947-Nov. 1951, Apr. 1952, Aug.-Sept. 1952, Jan. 1955.

8 in. observations missing for 15h. and 21h. Mar. 1927, all hours Mar. 1929, Aug. 1931, Jan. 1940, Nov. 1947-Nov. 1951, Aug.-Sept. 1952

Average soil and earth temperature at: CAMBRIDGE

51°9'N. 3°4'W. ht: 95 ft. Period 1928-55

Time of observation	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
	degrees Fahrenheit												
4 in. depth													
July 1928-Dec. 1933													
9h.	39.0	37.7	40.2	46.4	53.5	61.2	63.8	62.3	57.8	50.5	45.0	40.5	49.8
15h.													
21h.	40.1	38.7	42.8	48.9	56.0	64.4	66.6	64.9	60.3	51.7	45.9	41.2	51.8
July 1928-Dec. 1955													
9h.	29.5	39.2	41.3	48.0	54.5	61.3	63.9	62.6	58.0	51.2	45.4	41.6	50.6
Estimated mean of daily means	40.1	39.7	43.1	49.3	55.7	62.9	65.4	63.9	59.3	51.8	45.9	41.9	51.6
8 in. depth													
July 1928-Dec. 1933													
9h.	40.5	39.1	41.3	46.8	52.9	60.2	63.0	62.3	58.6	51.9	46.6	42.0	50.4
15h.													
21h.	41.1	39.8	43.5	49.5	56.2	64.3	66.8	65.6	61.3	53.3	47.3	42.5	52.6
July 1928-Dec. 1955													
9h.	40.8	40.4	42.8	48.1	53.6	60.0	62.9	62.4	58.7	52.7	47.0	43.0	51.0
Estimated mean of daily means	41.1	40.7	43.9	49.5	55.3	62.1	64.8	64.1	60.1	53.4	47.3	43.3	52.1

Soil type: 9 in. - 12 in. Silty loam on red marl.

Remarks: Observations missing at 4 in. depth in Oct. 1941, Jan.-Feb. 1953, July 1954.

Observations missing at 8 in. depth in Oct. 1928, June 1942, Aug.-Oct. 1944. All due to broken thermometers.

Average soil and earth temperature at: EAST MALLING

51°17'N. 0°24'E. ht: 122 ft. Period 1926-55.

Time of observation	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
	degrees Fahrenheit												
4 in. depth													
Jan. 1926-Dec. 1933													
9h.	38.6	37.5	40.1	45.6	53.3	59.6	63.9	62.8	57.5	49.1	42.9	40.2	49.3
15h.	39.8	39.5	45.8	51.7	60.2	68.1	70.7	70.1	64.7	53.4	45.8	40.1	54.2
21h.	39.1	38.8	42.2	48.3	56.2	63.5	67.2	66.1	59.7	50.7	43.9	41.2	51.4
Feb. 1926-Dec. 1955													
9h.	37.2	37.1	40.3	47.2	54.3	61.3	64.3	63.1	57.9	49.9	43.0	38.9	49.5
Estimated mean of daily means	37.5	37.7	41.3	48.5	55.7	63.3	65.9	64.7	59.0	50.7	43.5	39.4	50.6
8 in depth													
Jan. 1926-Nov. 1933													
9h.	39.3	38.4	40.6	45.5	52.4	58.5	63.5	62.6	58.1	50.1	43.8	40.9	49.5
15h.	38.9	39.0	42.6	48.3	56.0	63.0	66.7	66.1	61.7	51.9	45.3	41.1	51.7
21h.	39.7	39.3	42.6	48.4	56.1	62.7	66.9	66.3	60.5	51.9	44.8	41.4	51.7
1926-55													
9h.	38.0	37.9	40.7	46.4	53.1	59.9	63.4	62.5	58.1	50.4	43.1	39.9	49.5
Estimated mean of daily means	38.2	38.3	41.7	47.9	54.9	62.0	65.4	64.3	59.3	51.3	44.6	40.1	50.7
1925-55													
2 ft. depth													
9h.	40.1	39.8	41.9	47.2	53.1	59.7	63.6	63.5	60.2	53.5	47.0	42.3	51.0

Soil type: Medium loam 6'-8'.

Remarks: Change of site: 15h. May 3, 1949.

Observations were missing at the 4 in. and 8 in. depths for the 15h. and 21h. obs. many times during the period 1926-33. Observations missing at the 4 in. depths in Jan. 1928(9h.), Dec. 28-Jan. 29. Observations missing at the 8 in. depth (9h.) in July 1929, Mar.-Apr. 1944.

Average soil and earth temperature at: ELLBRIDGE

50°27'N. 3°15'W. ht. 200 ft. Period 1926-55

Time of observation	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
	degrees Fahrenheit												
4 in depth													
July 1926-July 1932													
9h.	40.2	39.1	41.1	46.7	52.8	59.9	61.9	59.3	57.8	50.5	45.7	41.9	49.7
15h.													
21h.	41.9	40.3	45.5	50.9	57.1	65.5	66.7	64.3	62.7	53.1	47.4	43.1	53.2
July 1926-Dec. 1955													
9h.	40.8	40.6	43.0	48.5	54.3	60.2	62.4	62.4	58.5	52.1	46.3	42.9	51.0
Estimated mean of daily means	41.7	41.7	45.2	50.6	56.5	63.0	64.8	64.7	60.9	53.4	47.7	43.5	52.8
8 in. depth													
July 1928-July 1932													
9h.	41.8	40.1	42.8	47.7	53.1	60.2	62.5	60.8	59.6	52.3	47.5	43.7	51.0
15h.													
21h.	42.6	41.1	45.3	50.4	56.0	64.2	65.9	63.9	62.7	53.9	48.1	44.4	53.2
July 1928-Dec. 1955													
9h.	42.2	41.9	42.6	49.2	54.5	60.3	62.3	63.0	59.8	53.7	47.8	44.1	51.3
Estimated mean of daily means	42.6	42.4	43.9	50.5	55.9	62.3	64.5	64.5	61.3	54.5	48.1	44.5	52.9

Soil type: Medium loam, with clay, at valley bottom

Remarks: Observations missing at the 4 in. depth in Sept. 1937-Aug. 1939, Mar. 1948, May 1948, July-Dec. 1948, Aug.-Sept. 1950, Aug., and Nov. 1951, June-July 1952, Nov. 1952.

Observations missing at the 8 in. depth in Mar. 1933, Oct. 1947, Mar, May 1948, July-Dec. 1948, Aug.-Sept. 1950, Aug. 1951, Nov. 1951, June-July 1952, Sept.-Dec. 1952, Dec. 1953-Jan. 1954.

Average soil and earth temperature at: GULVAL

50°8'N. 5°31'W. ht. 20 ft. Period 1926-55

Time of observation	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
	Degrees Fahrenheit												
4 in. depth													
Feb. 1926-July 1932													
9h.	42.3	41.9	43.9	48.9	55.3	60.2	64.0	62.1	59.0	51.7	46.5	43.1	51.6
15h.	45.7	46.7	51.2	57.8	63.9	69.2	72.0	70.3	66.9	57.5	50.3	45.6	58.1
21h.	43.7	44.2	47.2	52.5	58.6	63.8	68.1	65.6	62.3	53.7	47.9	44.0	54.3
1926-55													
9h.	42.2	42.1	44.5	49.7	55.5	60.9	63.9	63.2	59.1	52.8	47.2	43.6	52.1
Estimated mean of daily means	42.9	43.3	46.1	51.5	57.1	62.7	65.9	64.9	60.7	53.8	47.9	44.1	53.4
8 in. depth													
Feb. 1926-July 1932													
9h.	43.3	43.6	45.0	49.3	54.9	60.2	63.7	62.3	59.9	53.0	48.1	44.5	52.3
15h.	44.4	44.9	47.6	52.8	58.8	63.9	67.4	65.7	63.0	55.3	49.2	45.2	54.9
21h.	44.5	45.1	47.8	53.1	59.2	64.4	67.9	66.1	63.3	55.1	49.3	45.2	55.1
1926-55													
9h.	43.5	43.5	45.7	50.2	55.5	60.9	64.1	63.7	60.2	54.1	48.7	45.1	52.9
Estimated mean of daily means	44.1	44.3	47.1	52.1	57.7	63.0	66.2	65.6	61.9	55.1	49.3	45.5	54.3

Soil type: Sandy, 4 ft.

Remarks: Observation missing July 1932 at 9h., May-June 1935 and June-July 1943 thermometer broken.

8 in. observations missing: Septmeber 1946

Average soil and earth temperature at: HOUGHAIL

54°45'N. 01°35'W. ht: 160 ft. Period 1926-55

Time of observation	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
	degrees Fahrenheit												
4 in. depth													
Jan. 1926-Aug. 1932													
9h.	35.3	35.1	37.7	43.0	49.9	56.4	59.3	58.5	55.4	45.9	40.2	36.1	45.9
15h.	36.7	37.9	42.6	48.8	55.9	63.1	66.4	65.2	59.7	50.4	42.3	37.1	50.5
21h.	35.9	36.2	40.2	46.1	53.4	60.3	63.7	62.1	56.4	48.1	41.1	36.2	48.3
Jan. 1926-Dec. 1955													
9h.	35.7	36.1	38.5	44.2	50.5	57.1	60.4	59.0	54.1	47.2	41.4	37.5	46.8
Estimated mean of daily means	36.0	36.7	39.7	45.7	52.3	59.1	62.3	60.7	55.6	48.3	41.9	37.5	48.0
8 in. depth													
Jan. 1926-Aug. 1932													
9h.	36.5	36.3	38.8	43.7	49.6	55.8	59.5	59.0	55.1	48.4	42.2	37.8	46.9
15h.	36.8	37.1	39.9	44.9	50.7	57.3	61.0	60.3	56.4	48.7	42.1	37.9	47.8
21h.	36.7	36.6	39.6	45.0	51.5	58.1	61.3	60.7	56.5	48.9	42.4	37.6	47.9
Jan. 1926-Dec. 1955													
9h.	37.1	37.2	39.6	44.5	50.0	56.2	59.6	59.2	55.5	49.4	43.4	39.2	47.6
Estimated mean of daily means	37.2	37.3	40.0	45.1	50.9	57.3	60.5	60.1	56.2	49.7	43.5	39.1	48.1
1926-55													
2 ft. depth													
9h.	38.7	38.3	40.2	44.8	49.9	55.5	59.2	59.3	57.2	51.9	45.7	41.3	49.5

Soil type: Loam 8"

Average soil and earth temperature at: LONG ASHTON

51°26'N. 02°40'W. ht: 162 ft. Period: January 1925-December 1955

Time of observation	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
	Degrees Fahrenheit												
4 in. depth													
1926-33													
9h.	38.2	37.9	40.4	46.1	52.9	60.2	63.0	61.4	57.2	49.1	43.1	39.7	49.0
15h.	40.7	41.3	46.3	52.7	60.4	68.4	70.5	68.7	63.7	54.1	46.5	40.6	54.5
21h.	39.5	39.3	42.8	48.5	55.9	63.1	65.6	63.9	59.5	50.4	44.3	39.2	51.0
1926-55													
9h.	38.1	38.2	40.6	46.8	53.3	60.1	62.9	61.9	57.0	49.7	43.7	39.8	49.3
Estimated mean of daily means	38.7	38.9	41.8	48.0	54.8	61.5	64.2	63.1	58.1	50.3	44.3	40.1	50.3
8 in. depth													
1926-33													
9h.	39.5	39.0	40.8	46.0	52.2	59.2	62.3	61.4	58.0	50.3	44.6	40.1	49.5
15h.	40.2	40.0	43.0	48.8	55.6	62.9	65.6	64.6	60.9	52.3	45.7	40.7	51.7
21h.	40.2	40.1	43.3	49.1	56.1	63.6	66.1	64.9	60.9	52.0	45.5	40.5	51.9
1926-55													
9h.	39.2	39.2	41.3	46.6	52.5	59.1	62.2	61.6	57.6	50.6	44.9	41.0	49.7
Estimated mean of daily means	39.5	39.7	42.5	48.1	54.5	61.3	64.1	63.3	59.1	51.7	45.4	41.2	50.9
1925-55													
2 ft. depth													
9h.	41.9	41.4	43.1	48.0	55.3	59.3	62.4	62.9	60.5	55.0	49.0	44.5	51.8

Soil type: fine sandy loam

Remarks: Change of site: January 1, 1932.

8 in. thermometer broken Feb.-Mar. 1927

Average soil and earth temperature at: LONG SUTTON

51°12'N. 00°55'W. ht: 479 ft. Period: Nov. 1925-1955

Time of observation	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
	degrees Fahrenheit												
4 in. depth													
Nov. 1925-July 1932													
9h.	37.8	37.1	39.8	45.5	53.2	59.3	63.2	61.1	57.4	48.9	42.8	38.2	48.7
15h.	39.2	39.5	44.6	50.7	59.0	65.7	69.5	67.5	62.8	53.0	45.0	39.4	53.0
21h.	38.4	37.9	41.6	47.2	55.3	61.2	65.3	63.5	59.0	50.1	43.5	38.5	50.1
Nov. 1925-1955													
9h.	37.5	37.5	40.6	47.0	54.3	60.8	63.8	62.6	56.0	50.3	43.8	39.5	49.6
Estimated mean of daily means	37.8	37.9	41.5	47.9	55.3	61.7	64.9	63.8	58.3	50.9	44.1	39.7	50.4
8 in. depth													
Nov. 1925-July 1932													
9h.	38.4	37.9	40.3	45.7	52.6	58.7	62.5	61.0	58.3	50.3	43.9	39.2	49.1
15h.	39.0	38.8	42.5	48.6	56.1	62.4	65.8	64.0	60.6	51.9	45.1	39.7	51.2
21h.	38.7	38.4	41.7	47.6	55.2	61.0	65.1	63.6	59.8	51.3	44.3	39.4	50.5
Nov. 1925-1955													
9h.	38.2	38.3	41.3	47.4	54.3	60.8	64.0	63.1	59.0	51.6	44.8	40.3	50.3
Estimated mean of daily means	38.3	38.5	42.0	48.3	55.6	61.9	65.3	64.4	60.3	52.1	45.0	40.4	51.0
June 1951-April 1959													
2 ft. depth.													
9h.	40.9	39.0	41.9	47.6	54.1	59.0	62.9	62.3	59.6	53.9	47.9	44.3	51.1

Soil type: 4 ft. of clay over chalk
Change of site January 27, 1932.

Remarks: 4 in. observations missing: Apr., Aug. 1949; Apr. 1950-May 1951, July-Sept. 1955

8 in. observations missing: Feb.-Mar., 1927; Apr., Aug. 1949; June-July 1953.

Average soil and earth temperature at Morpeth (COCKLE PARK)

55°13'N. 1°41'W. ht: 325 ft. Period 1926-55

Time of observation	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
	Degrees Fahrenheit												
4 in. depth													
Feb. 1926-Dec. 1933													
9h.	35.1	35.5	37.9	42.9	50.3	56.6	59.7	57.7	52.7	45.0	39.8	36.8	45.8
15h.													
21h.	35.6	36.1	39.4	45.1	52.1	59.1	62.2	60.0	54.6	46.1	40.4	37.0	47.3
Feb. 1926-Dec. 1955													
9h.	35.1	35.5	38.1	43.4	50.5	57.0	59.9	57.8	52.6	46.0	40.3	36.9	46.1
Estimated mean of daily means	35.3	35.8	38.7	44.5	51.4	58.3	61.1	58.9	53.5	46.5	40.6	37.0	46.8
8 in. depth													
Feb. 1926-Dec. 1933													
9h.	35.9	36.2	38.4	42.7	49.1	55.9	58.7	57.4	53.3	46.2	41.0	37.8	46.1
15h.													
21h.	36.1	36.7	40.0	45.2	52.2	59.8	62.1	60.6	55.6	47.5	41.5	37.9	47.9
Feb. 1926-Dec. 1955													
9h.	35.9	36.2	38.7	43.4	49.6	56.0	58.9	57.7	53.3	47.1	41.4	37.7	46.3
Estimated mean of daily means	36.0	36.5	39.5	44.7	51.1	57.9	60.6	59.3	54.5	47.7	41.7	37.9	47.3

Soil type: Sandy loam 17" and clay loam overlying boulder clay

Remarks: Observations missing Oct. 1927-Mar. 1928, at 09h.-21h. at depth 4" and 8"
Observations missing at the 4 in. depth in May 1942, 1943 and July 1942
Observations missing at the 8 in. depth in Apr. 1926-March. 1927,
June-Sept. 1928, Mar.-May 1947, Apr. 1954 and May 1942 and 1943.
All due to broken thermometers.

Average soil and earth temperature at: NEWPORT (SALOP)

52°47'N. 02°36'W. ht: 211 ft. Period Feb. 1928-55

Time of observation	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
	degrees Fahrenheit												
4 in. depth													
Feb. 1928-July 1932													
9h.	37.9	36.4	38.3	44.0	50.8	57.5	60.1	57.7	54.3	47.6	42.9	39.0	47.2
15h.													
21h.	38.9	37.5	40.3	46.3	53.8	61.4	63.1	60.7	57.2	49.4	43.9	39.6	49.3
Feb. 1928-1955													
9h.	37.6	37.4	39.9	45.4	51.5	57.7	61.1	59.8	55.4	48.8	43.1	39.5	48.1
Estimated mean of daily means	38.1	37.9	40.9	46.5	53.0	59.7	62.6	61.3	56.9	49.7	43.6	39.8	49.2
8 in. depth													
Feb. 1928-July 1932													
9h.	38.7	37.1	38.7	43.7	50.1	56.4	59.5	57.5	54.7	48.5	43.8	40.2	47.4
15h.													
21h.	39.1	37.8	40.3	46.0	53.0	59.9	62.5	60.3	57.2	50.0	44.5	40.5	49.3
Feb. 1928-1955													
9h.	38.4	38.1	40.3	45.3	51.0	56.8	60.4	59.7	55.8	49.7	44.1	40.4	48.3
Estimated mean of daily means	38.6	38.5	41.1	46.5	52.5	58.5	61.9	61.1	57.1	50.5	44.5	40.5	49.3

Soil type: Sandy loam 3 ft.

Remarks: Change of site: October 2, 1950.
4 in. and 8 in. depth missing July-November 1939 and July 1942;
8 in. thermometer broken August 1-5, 1931.

Average soil and earth temperature at: NEWTON ABBOT

50°33'N. 03°38'W. ht. 370 ft. Period 1926-55

Time of observation	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
						degrees Fahrenheit							
4 in. depth													
1926-1933													
9h.	39.2	38.9	41.4	47.3	54.7	61.6	64.4	62.9	56.6	49.8	43.9	39.6	50.2
15h.	41.2	41.7	47.0	54.5	62.4	69.3	72.5	70.7	65.6	54.2	46.8	41.4	55.7
21h.	40.4	40.5	44.3	50.9	58.6	65.9	68.4	66.4	61.6	51.7	45.2	40.2	52.8
1926-55													
9h.	39.1	38.8	41.5	47.6	54.8	61.5	64.1	62.9	57.9	50.4	44.3	40.5	50.3
Estimated mean of daily means	39.7	39.6	42.9	49.6	56.7	63.7	66.1	64.7	59.4	51.3	44.9	40.8	51.6
8 in. depth													
1926-33													
9h.	40.0	39.8	42.1	47.5	54.5	61.2	64.4	62.6	59.3	51.1	45.1	40.6	50.7
15h.	40.4	40.3	43.3	49.5	56.8	63.7	67.7	64.8	60.9	52.0	45.6	40.8	52.1
21h.	40.7	40.8	44.1	50.7	58.1	65.3	68.1	66.0	61.9	52.6	46.0	41.1	52.9
1926-1955													
9h.	39.8	39.7	42.4	48.0	54.6	61.4	64.1	63.0	57.7	51.2	45.4	41.5	50.9
Estimated mean of daily means	40.1	40.2	43.4	49.6	56.4	63.5	66.9	64.7	60.0	52.3	45.9	41.7	52.0

Soil type: 9"-12" Silty loam over shillet.

Remarks: Change of site: December 16, 1948.

4 in. observations missing: Aug. 1945; July 1946 and March 1948. During July 1947 rabbits interfered with thermometer.

8 in. observations missing: Aug. 1932; April 1945-July 1946; July 1947-March 1948; Feb. and June 1954.

Average soil and earth temperature at: NEWTON RIGG

50°01'N. 02°49'W. ht: 560 ft. Period June 1928-1955

Time of observation	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
	degrees Fahrenheit												
4 in. depth													
June 1928-1955													
9h.	35.8	35.7	38.5	43.7	50.4	57.2	59.7	58.5	53.8	47.5	41.7	38.1	46.7
* 15h.	36.8	35.4	39.3	46.1	55.6	62.1	63.8	62.1	57.2	49.1	42.9	39.1	49.1
21h.	36.2	36.3	40.0	45.7	52.7	59.6	61.9	60.4	55.2	48.4	42.2	38.2	48.1
June 1928-1955													
9h.	35.8	35.7	38.3	43.8	50.5	57.2	59.7	58.5	53.8	47.5	41.7	38.1	46.7
Estimated mean of daily means	36.0	36.0	39.1	44.8	51.7	58.4	60.8	59.5	54.5	47.9	41.9	38.1	47.4
8 in. depth													
June 1928-1955													
9h.	36.8	36.6	39.3	44.0	50.1	56.6	59.5	58.9	54.6	48.7	42.9	39.0	47.3
** 15h.	37.2	36.1	39.3	43.3	50.0	57.5	60.7	60.2	54.8	48.4	43.8	39.5	47.7
21h.	36.9	37.1	40.5	46.1	52.6	59.3	61.9	60.7	55.8	49.4	43.3	39.1	48.6
June 1928-1955													
9h.	36.8	36.6	39.1	44.1	50.2	56.6	59.5	58.9	54.5	48.7	42.9	39.0	47.3
Estimated mean of daily means	36.9	36.9	39.7	45.1	51.5	57.9	60.7	59.8	55.2	49.1	43.1	39.1	47.9

Soil type: Medium loam 18 in. deep

Remarks: * 15h. observations from June 1928-Sept. 1932 only.

4 in. observations missing: May 1932, March 1947 and April 1955

8 in. observations missing: June 1929-August 1931 all hours and February-June 1937 ~~February-June 1937~~ ~~0212~~

Average soil and earth temperature at: ROTHAMSTED

51°48'N. 00°22'W. ht: 420 ft. Period Feb. 1926-55

Time of observation	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
						degrees Fahrenheit							
4 in. depth													
Feb. 1926-1932													
9h.	36.8	36.1	38.8	44.1	52.2	59.4	62.7	60.9	56.3	47.3	41.5	37.5	47.8
15h.	38.6	38.8	44.3	50.1	59.3	67.6	69.6	66.2	63.0	52.5	44.7	39.2	53.0
21h.	37.9	37.5	41.3	47.1	55.6	63.7	66.2	64.5	59.1	49.0	42.9	38.2	50.3
Feb. 1926-55													
9h.	36.2	36.2	39.0	45.4	52.5	59.8	62.9	61.5	56.3	48.2	41.9	37.9	48.1
Estimated mean of daily means	36.7	36.9	40.3	46.9	54.2	61.9	64.7	63.3	57.7	49.1	42.6	38.3	49.4
8 in. depth													
May 1926-1932													
9h.	37.5	36.4	39.1	43.8	50.9	58.1	61.6	60.3	56.7	48.3	42.7	38.5	47.8
15h.	38.0	37.1	40.9	46.2	54.1	61.6	64.7	63.3	59.3	50.3	43.7	39.0	49.9
21h.	38.0	37.3	41.3	46.7	55.1	62.6	65.6	64.1	59.6	50.1	43.6	39.0	50.2
May 1926-1955													
9h.	37.2	37.0	39.7	45.3	51.8	58.8	62.1	61.3	56.9	49.3	43.1	38.9	48.5
Estimated mean of daily means	37.5	37.5	40.8	46.7	53.9	61.1	64.1	63.2	58.3	50.2	43.5	39.1	49.7
June 1946-55													
2 ft. depth													
9h.	40.1	38.7	40.7	45.6	51.1	56.7	60.7	61.3	58.5	53.2	46.9	42.7	49.7

Soil type: Clay with flints on surface, heavy clay below.

Remarks: 4 in. thermometer broken for a short period, October 1928.

8 in. thermometer broken for a short period, April 1929

2 ft. thermometer under bare soil

Average soilt and earth temperature at: SPROWSTON

52°40'N. 01°20'E. ht: 93 ft. Period 1926-55

Time of observation	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
	degrees Fahrenheit												
4 in. depth													
1926-Aug. 1932													
9h.	37.7	37.6	39.4	44.7	51.1	57.1	61.0	59.9	56.0	48.5	43.3	39.2	48.0
15h.	39.1	39.7	43.8	49.1	56.8	63.2	66.6	65.3	61.1	52.2	45.4	40.2	51.9
21h.	38.5	38.6	41.3	46.6	53.7	59.7	63.4	62.1	57.9	49.9	44.2	39.6	49.6
1926-55													
9h.	37.5	37.4	39.7	45.5	52.0	58.0	61.3	60.4	56.2	49.4	43.7	39.0	48.4
Estimated mean of daily means	37.9	37.9	40.7	46.5	53.3	59.3	62.5	61.5	57.1	50.1	44.1	39.8	49.2
8 in. depth													
1926-Aug. 1932													
9h.	38.6	38.3	39.8	44.4	50.1	55.8	59.7	59.0	55.9	49.1	43.9	39.7	47.9
15h.	39.2	39.2	43.0	46.8	53.3	59.1	62.8	62.1	58.7	51.2	45.2	40.7	50.0
21h.	39.2	39.1	41.7	46.6	53.1	59.2	62.9	61.9	58.2	50.7	45.0	40.5	49.8
1926-55													
9h.	38.6	38.4	40.3	45.4	51.1	56.7	60.1	59.9	56.4	50.4	45.0	40.8	48.6
Estimated mean of daily means	38.9	38.8	41.3	46.5	52.4	58.4	61.7	61.3	57.5	51.2	45.5	41.2	49.6

Soil type: 2-5 ft. gravelly loam

Remarks: Observation at 4 in. depth missing in September 1936 due to broken thermometer

Average soil and earth temperature at: SUTTON BONINGTON

52°50'N. 01°15'W. ht: 157 ft. Period 1926-55

Time of observation	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
	degrees Fahrenheit												
4 in. depth													
1926-Sept. 1932													
9h.	37.8	37.0	39.0	44.1	51.0	57.7	61.7	59.7	55.4	47.2	41.7	37.8	47.5
15h.	39.2	39.1	42.1	49.1	56.9	64.3	68.2	65.4	60.1	50.8	44.3	39.4	51.6
21h.	38.5	38.0	41.0	46.4	53.3	60.5	64.5	62.2	57.5	48.5	43.1	38.7	49.3
1926-55													
9h.	37.2	37.1	39.5	45.3	52.0	58.5	61.8	60.[illegible]	56.0	48.9	42.9	39.0	48.2
Estimated mean of daily means	37.5	37.[illegible]	40.5	46.5	53.1	59.9	63.2	61.[illegible]	57.1	49.3	43.[illegible]	39.5	49.2
8 in. depth													
1926-Sept. 1932													
9h.	38.2	37.6	39.4	43.9	49.9	56.5	60.3	59.1	55.7	48.2	42.4	38.4	47.5
15h.	38.9	38.5	41.3	46.7	53.3	60.5	64.1	62.4	58.3	50.1	43.9	39.3	49.8
21h.	38.7	38.3	41.1	46.2	53.2	59.9	63.3	62.1	57.6	49.5	43.5	39.1	49.4
1926-55													
9h.	38.0	37.8	40.0	45.2	51.3	57.5	60.9	60.3	56.5	49.7	43.9	40.0	48.4
Estimated mean of daily means	38.3	38.1	40.[illegible]	44.3	52.[illegible]	59.2	62.4	61.[illegible]	57.5	50.3	44.5	40.3	49.4

Soil type: Sandy loam over gravel.

Remarks: 4 in. depth observations missing: July, Sept.-Oct. 1927, Aug. 1928, Nov.-Dec. 1951, Aug. 1953 (broken thermometer).

8 in. depth observations missing: May 1933, Aug.-Sept. 1952 (broken thermometer)

Average soil and earth temperature at: WYE

51°11'N. 00°57'E. ht: 164 ft.* Period 1926-55

Time of observation	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
	degrees Fahrenheit												
4 in. depth													
1926-Aug. 1932													
9h.	38.2	37.6	39.8	45.3	53.0	59.4	63.0	61.6	56.8	49.2	44.4	39.6	49.0
15h.	40.1	39.9	44.5	51.8	61.0	67.7	71.0	69.1	63.6	53.0	46.4	41.1	54.1
21h.	39.1	38.8	41.6	48.0	56.0	62.3	65.7	64.3	59.4	50.4	45.1	40.2	50.9
1926-55													
9h.	38.3	38.0	40.5	46.8	53.4	60.1	63.4	62.7	58.0	50.7	44.8	40.4	49.8
Estimated mean of daily means	38.7	38.6	41.4	48.1	54.9	61.5	64.7	64.1	59.3	51.3	45.1	40.7	50.7
8 in. depth													
1926-Aug. 1932													
9h.	39.1	38.4	40.1	45.1	51.3	57.7	61.8	60.8	57.4	50.3	45.4	40.7	49.0
15h.	39.6	39.0	41.8	47.1	54.8	60.7	64.6	63.2	59.0	51.3	45.9	41.3	50.7
21h.	39.7	39.2	41.9	47.6	55.3	61.3	65.1	63.7	59.3	51.5	46.0	41.3	51.0
1926-55													
9h.	39.0	38.9	41.1	46.6	52.7	59.0	62.6	61.9	58.3	51.8	46.0	41.4	49.9
Estimated mean of daily means	39.3	39.3	42.0	47.9	54.5	60.8	64.3	63.3	59.3	52.4	46.3	41.7	50.9
2 ft. depth (Sept. 1924-Dec. 1955)													
9h.	41.6	40.8	42.3	47.0	52.2	58.3	61.8	62.2	59.8	54.5	48.8	44.3	51.1

Soil type: Deep brick earth.

Remarks: Change of site: January 1, 1955, same soil.

* Height: 165 ft. from January 1, 1953.

4 in. depth observations missing: June 1927, Sept. 1930, June 1938, June 1942 July 1944, Sept. 1954, (broken thermometer) 15h. March 1929.

8 in. depth observation missing: Aug. 1938, Feb. 1947-Feb. 1948, Jan.-Feb. 1952, July 1953 (broken thermometer) 15th March 1929

2 ft. depth observations missing: Dec. 1928, Oct.-Dec. 1940 (broken thermometer) May 1945, May 1946.

Average soil and earth temperature at WISLEY

51° 17'N. 00° 26'W. ht. 150 ft. Period: 1926-55

Time of observation	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
						degrees Fahrenheit							
4 in. depth 1926-July 1932													
9h.	38.5	37.8	40.3	46.4	54.5	61.0	64.5	61.6	57.0	49.3	44.2	40.2	49.6
15h.	40.1	40.3	45.0	52.1	60.9	69.0	71.2	67.5	61.4	52.6	45.9	41.3	53.9
21h.	38.9	38.5	41.5	47.6	55.2	62.1	65.3	63.0	58.5	49.9	44.4	40.2	50.4
1926-55													
9h.	38.1	37.9	40.8	47.2	54.6	61.4	64.5	62.8	57.9	50.6	44.4	40.1	50.0
Estimated mean of daily means	38.3	38.3	41.4	47.8	54.9	61.9	64.9	63.5	58.7	50.9	44.5	40.1	50.4
8 in. depth 1926-July 1932													
9h.	39.1	38.5	40.7	46.0	52.8	59.1	62.6	61.0	57.3	50.2	45.0	41.0	49.4
15h.	39.7	39.5	43.0	49.1	56.6	63.5	66.7	64.3	59.7	51.7	45.7	41.3	51.7
21h.	39.5	39.1	42.5	48.4	55.8	62.3	65.5	63.8	58.9	51.1	45.2	41.0	51.1
1926-55													
9h.	39.0	39.0	41.4	47.2	53.6	60.7	63.4	62.6	58.5	51.7	45.6	41.3	50.3
Estimated mean of daily means	39.2	39.3	42.3	48.4	55.1	62.3	64.9	64.0	59.3	52.1	45.7	41.3	51.2
2 ft. depth 1926-55													
9h.	41.1	40.7	43.0	48.2	53.7	59.5	63.0	63.3	60.5	54.5	48.2	43.7	51.6

Soil type: Light, sandy.

Remarks: 8 in. depth Feb. 1934 and Dec. 1937 missing.

2 ft. depth Sept. 1932 and Jan. 1938 missing.

G.1169/3/61/DEW/30

Average soil and earth temperature at WOBURN

51° 1'N. 00° 35'W. Ht. 291 ft. Period 1930 - 55.

Time of observation	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
	degrees Fahrenheit												
4 in. depth													
1930 - 55													
9h.	36.9	36.9	40.0	46.5	53.4	60.4	63.1	61.6	56.1	48.4	42.4	38.6	48.7
15h.	38.3	39.6	45.1	53.3	61.2	68.6	70.8	69.2	62.5	53.2	45.0	40.0	53.9
21h.	37.6	38.2	42.7	50.0	57.6	64.8	67.3	65.6	58.9	50.1	43.4	39.0	51.3
1930 - 55													
9h.	36.9	36.9	40.0	46.5	53.4	60.4	63.1	61.6	56.1	48.4	42.4	38.6	48.7
Estimated mean of daily means	37.3	37.5	41.3	48.3	55.5	62.6	65.2	63.6	57.5	49.3	42.9	38.8	50.0
8 in. depth													
1930 - 55													
9h.	37.6	37.7	40.8	47.0	53.6	60.4	63.4	62.3	57.2	49.7	43.5	39.5	49.4
15h.	38.0	38.3	42.4	49.3	56.4	63.4	66.2	64.9	59.3	51.2	44.2	39.8	51.1
21h.	38.1	38.6	43.0	50.3	57.6	64.6	67.4	65.9	59.8	51.3	44.3	39.8	51.7
1930 - 55													
9h.	37.6	37.7	40.8	47.0	53.6	60.4	63.4	62.3	57.2	49.7	43.5	39.5	49.4
Estimated mean of daily means	37.9	38.1	41.9	48.7	55.6	62.5	65.4	64.1	58.5	50.5	43.9	39.7	50.6
1931 - 55													
2 ft. depth													
9h.	40.0	39.9	42.4	48.0	53.8	60.0	63.2	63.0	59.1	52.8	46.4	42.3	50.9

Soil type: Sand

Remarks: